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HOPS: STATISTICAL-ECONOMIC ANALYSIS OF MARKETING

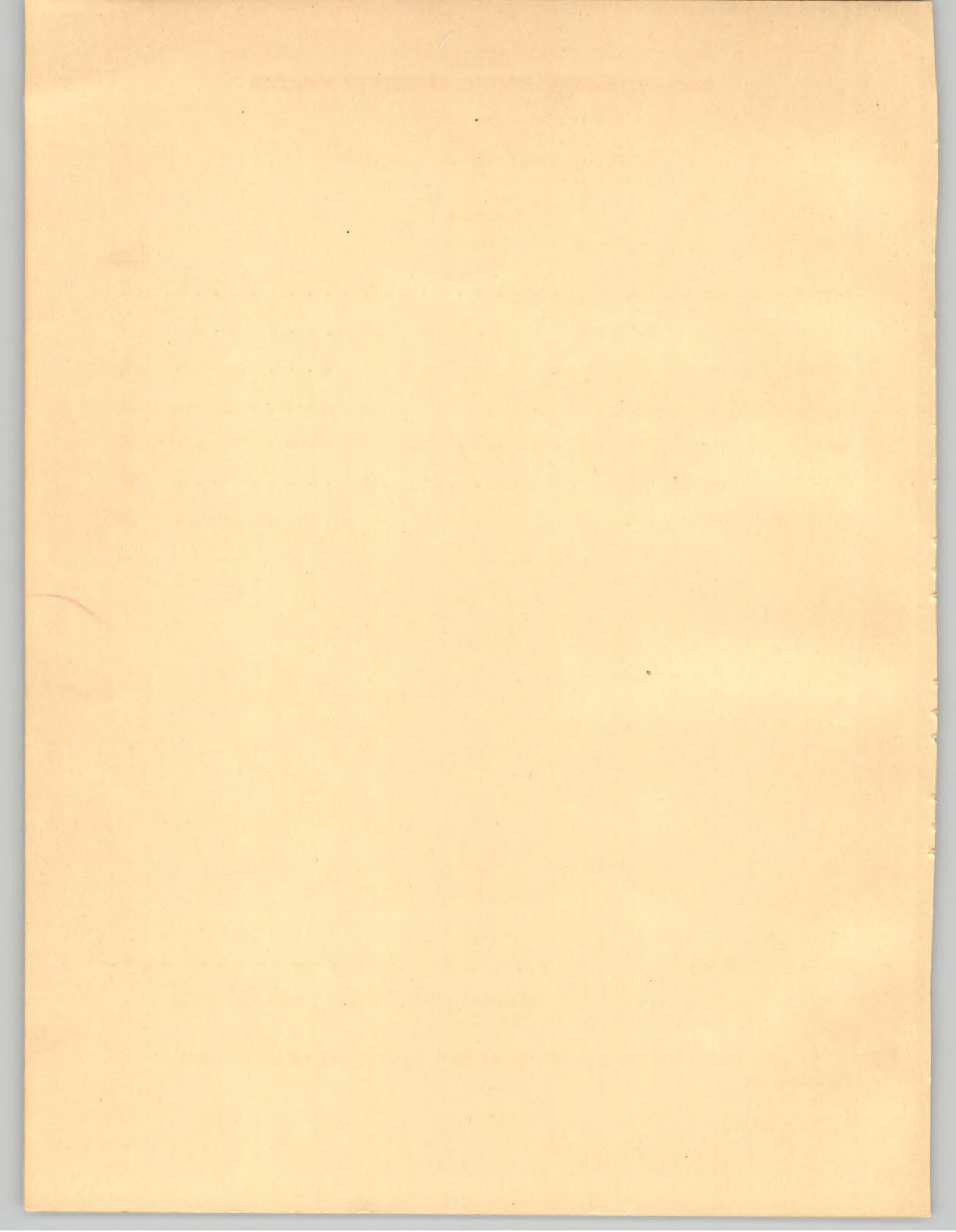
by

Sidney Hoos and J. N. Boles

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HOPS: STATISTICAL-ECONOMIC ANALYSIS OF MARKETING

by

Sidney Hoos^{1/} and J. N. Boles^{2/}

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Streeter House, May 4, 1928

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Experiments

HOPS: STATISTICAL-ECONOMIC ANALYSIS OF MARKETING

Introduction

This report results from an investigation undertaken at the request of the United States Hop Growers Association. That group, faced with current and prospective marketing problems, felt the need of statistical price analyses which would aid in appraising results of alternative lines of action. These lines of action relate to the control of hop supplies flowing to market under the jurisdiction of a federal marketing order.

Hop growers have operated under a federal marketing order at various times since 1938. The present order became effective in July, 1949, after the price developments in the fall of 1948 when, for the first time since World War II, the available supply of hops was substantially greater than the demand and when the price appeared unreasonable to most growers. An indication of the situation is that during the fall of 1948 the prices for uncontracted hops dropped sharply, from about 65 cents to 30 cents or less per pound. And even this marked decrease did not absorb the available supplies.

With the introduction of the federal marketing order in the middle of 1949, the price situation for hops improved from the viewpoint of producers and prices increased, although not necessarily only because of the order. The increase was sharp enough so that the price for best quality hops reached 83 cents per pound in the fall of 1950, although sales of the entire crop of 1950 averaged about 65 cents per pound.

Although cost of production figures generally are notoriously unreliable, a figure of from 35 cents to 55 cents a pound is a range within which cost of production probably lies in the past year or two for most hop growers, depending upon the area of production and other factors. The favorable returns to many growers in 1949 and 1950 stimulated new production. This expanded production is reflected in an increase of about 5,000 acres planted in 1950, at a time when there was no shortage. The expanded production was also reflected in what hop growers viewed as a "surplus" in 1951, in an amount of 17 million pounds; and many growers were dissatisfied with the situation, although other growers undoubtedly made favorable returns due to fortunate future sales.

In view of the situation in 1951, it became clear to many in the industry that the continuation of a federal marketing order striving for higher prices with "parity" as a goal was not consistent with a market price situation where

neighbourhood

Heilbronn was occupied by British troops on 21 May 1945, and the following day the British government issued a statement that the British government had received a report from the British military authorities in Germany that the German government had agreed to the terms of the Potsdam Agreement, and that the British government had accepted the terms of the Potsdam Agreement.

the satellite subspecies to pose less separation difficulties. However, given the demands for
minimizing the time necessary for separation of most flowers. An interpretation of this
evidence before separating the two species is that it is best to wait for anthesis to begin
and then to use 30 centimetre or less bar spacing. And even

It is necessary for the government to take steps to prevent such cases in the future.

increased quantities of hops remained unsold. There appeared to be more growers taking the view that, from the long-run interests of the industry, the marketing policies and programs which were being followed required careful review.

Substantial differences of opinion exist among growers as to appropriate lines of action under the current and prospective situation. Some growers wish to eliminate the federal marketing order and "let the law of supply and demand take care of the situation." Other growers feel that the federal marketing order should be continued but in a modified form. As an early step in clarifying the situation, the management of the United States Hop Growers Association recognized that some sort of analysis would be helpful which would suggest the various prices, in a given season, which are likely to result from particular market situations. To help meet that objective is the major purpose of this report. Additional background material is also provided for the aid of those who are less familiar with the hop industry and its marketing; for the specialists in that area, the results of the section on statistical price analysis are more pertinent, and the material in the remaining sections is more for establishing an appropriate setting.

The following section of this report presents a brief picture of the "Economic Setting and Background" in order to provide the general reader with some basis for reviewing the current situation. The third section, "Survey of Economic Trends," outlines what has occurred in the industry in terms of behavior over time in acreage, production, yield, prices, and trade. With this material as a basis, the reader may then go forward to the next section, "Hop Marketing Agreement," where the administration and operation of the agreement and order are explained. Then, in the section, "Statistical Price Analysis," we present results from our investigations on the major factors affecting the season average farm price of hops, and briefly indicate how the results of the statistical price analysis may be used in the operation of the hop marketing order. The final section, "Concluding Comments," considers the use of the price analysis and the role of the marketing order in meeting the needs of the hop industry.

Economic Setting and Background

Almost all United States hops are now grown in the Pacific Coast states of California, Oregon, Washington, and Idaho. In 1950-51, there were over 800 growers in these states cultivating almost 39,000 acres and producing over

58 million pounds of hops. Some of these growers were dealers in hops and some were brewers growing hops for their own use. The salable quantity for 1950-51, 50 million pounds, at the season average farm price of 62.1 per pound was valued at approximately 31 million dollars.

Nearly all of the hops consumed domestically go into the production of fermented malt liquors such as beer and ale. Providing the brew with its unique flavor, about four-tenths of a pound of hops is used in the production of a 31-gallon barrel of beer. Since there is no close substitute for hops and since the cost of hops makes up only a very small proportion of the cost of producing beer, the domestic consumption of hops does not seem to be significantly influenced by its price. Brewmasters tend to use the amount of hops per barrel which they think will make their product most salable, whether the current hop price is relatively high or relatively low.

Brewers maintain fairly large stocks of hops. September 1 stocks, at the beginning of the crop year, have averaged well over 50 per cent of annual consumption each postwar year following 1946-47, and reached 80 per cent in 1949-50. Hops flow into United States stocks from domestic and foreign growers and flow out of United States stocks mainly to domestic and foreign brewers. At various times, through voluntary decisions on the part of individual growers, a fraction of the current production has remained unharvested for economic reasons. At other times, under the provision of a federal hops marketing order, each grower has been permitted to sell only a stipulated percentage of his crop and for the most part has allowed the unsalable portion of his crop to remain unharvested.

In postwar years there has been a net export balance of more than 5 million pounds every year with no clear trend evident in either exports or imports. Imports come principally from Germany and Czechoslovakia, surmounting a 2½ cents per pound tariff, while exports go primarily to non-European countries. Thus, the harvested portion of the United States crop goes into United States stocks from which are derived the large quantities used domestically and the 5 to 10 million pounds required for the net export balance. Since the inflow and outflow have no precise automatic adjustment, the quantity of hops on hand at the end of one season and the beginning of the next varies from year to year.

Most of the crop is harvested in the fall months of August, September, and October. During this period, many growers negotiate with dealers and sign forward contracts for the crop to be harvested the following season, so the price is determined on a major segment of the harvest before the size of the harvest

is known. As the statistical price analysis in a later section will show, among the principal determinants of the United States season average farm price is the size of the hop inventory at the beginning of the crop year, and the level of national total consumption expenditures for all goods and services.

At the time when the prices are determined, the size of current stocks is known, the amount of current movement from growers is known, and domestic consumption and the next export balance can be estimated. From these figures comes an estimate of stocks on hand at the beginning of the following season. If these stocks are expected to be relatively low, then brewers will wish to add to their stocks, even at relatively high prices; if these stocks are expected to be relatively high, then brewers will add to their stocks only if the price is low.

The information utilized in this study, from 1933-34, comes from a period which includes significant events for the brewing and hop industries. Prohibition was in effect until 1933. The depression and recovery of the thirties was followed by the high employment, high income and relative shortage of consumer goods during and following World War II. As a part of the economic background and setting, therefore, the following section will summarize the effects of the changing economic environment on hop acreage, yield, production, consumption, imports, exports, stocks, and prices.

Survey of Economic Trends

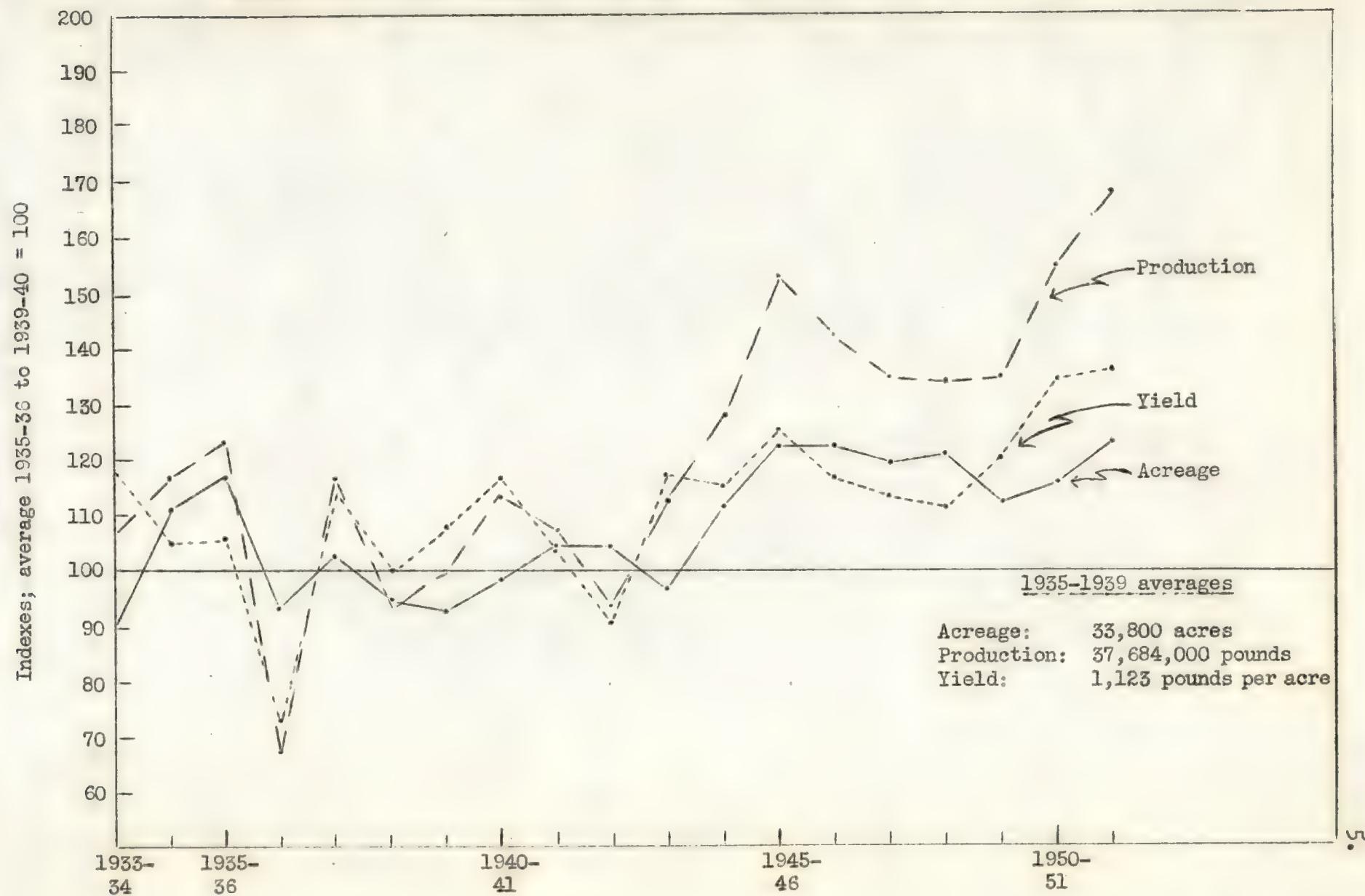
Acreage in hops declined sharply in 1917 even though the Volstead Amendment was not in effect until 1918. Acreage harvested during the years shortly before World War I averaged over 40,000 acres annually, but with prohibition acreage dropped and fluctuated between 18,000 to 27,000 acres during the 1920's and early 1930's. Anticipating the repeal of the 18th Amendment, acreage harvested expanded in 1933 and by 1935-36 reached a pre-World War II peak of about 39,000 acres. Then there was a sharp reduction in 1936-37 to 31,000 acres. Until 1943-44, acreage harvested fluctuated around 32,000 acres, and since then has averaged close to 40,000 acres. In 1951-52 the acreage for "hops harvested and salable under marketing agreement, hops harvested but not salable under marketing agreement, and hops produced but not harvested" was 41,200 acres compared to 37,138 acres as an average for the period 1940-1949.

Figure 1 compares the annual acreage, production and yield expressed as percentages of their average during the period 1935-1939. The increased

CHAPTER 6: GOALS OF THE PROJECT

FIGURE 1

United States Hops; Indexes of Acreage, Production, and Yield Per Acre from 1933-34



production beginning in the middle 1940's resulted from both expanded acreage and improved yields. But since the late 1940's, the sharp increase in production was due more to the increased yields than to acreage which increased less sharply. Thus by 1951-52, yield had reached on all-time high, whereas acreage was about the same as in 1945-46 as the several following years.

The average yield of hops per acre varies considerably from season to season. This occurs as a result of variable climatic factors, and also as lands of varying productivity come into production or go out of production. This variability of yield is one factor encouraging the brewers and others to carry fairly large stocks from one season to the next. The average yield during the period 1940 to 1949 was 1,267 pounds per acre harvested compared with over 1,500 pounds per acre during 1950 and 1951.

With a greater number of acres in production and with above average yields, production estimates of 58.4 million pounds in 1950 and 63.2 million pounds in 1951 were not surprising even though the 1940 to 1949 average was only 47.1 million pounds. In 1951-52, acreage was 23.4 per cent higher than the average acreage for the period 1935 to 1939, yield was 36.7 per cent higher and production was 67.8 per cent higher.

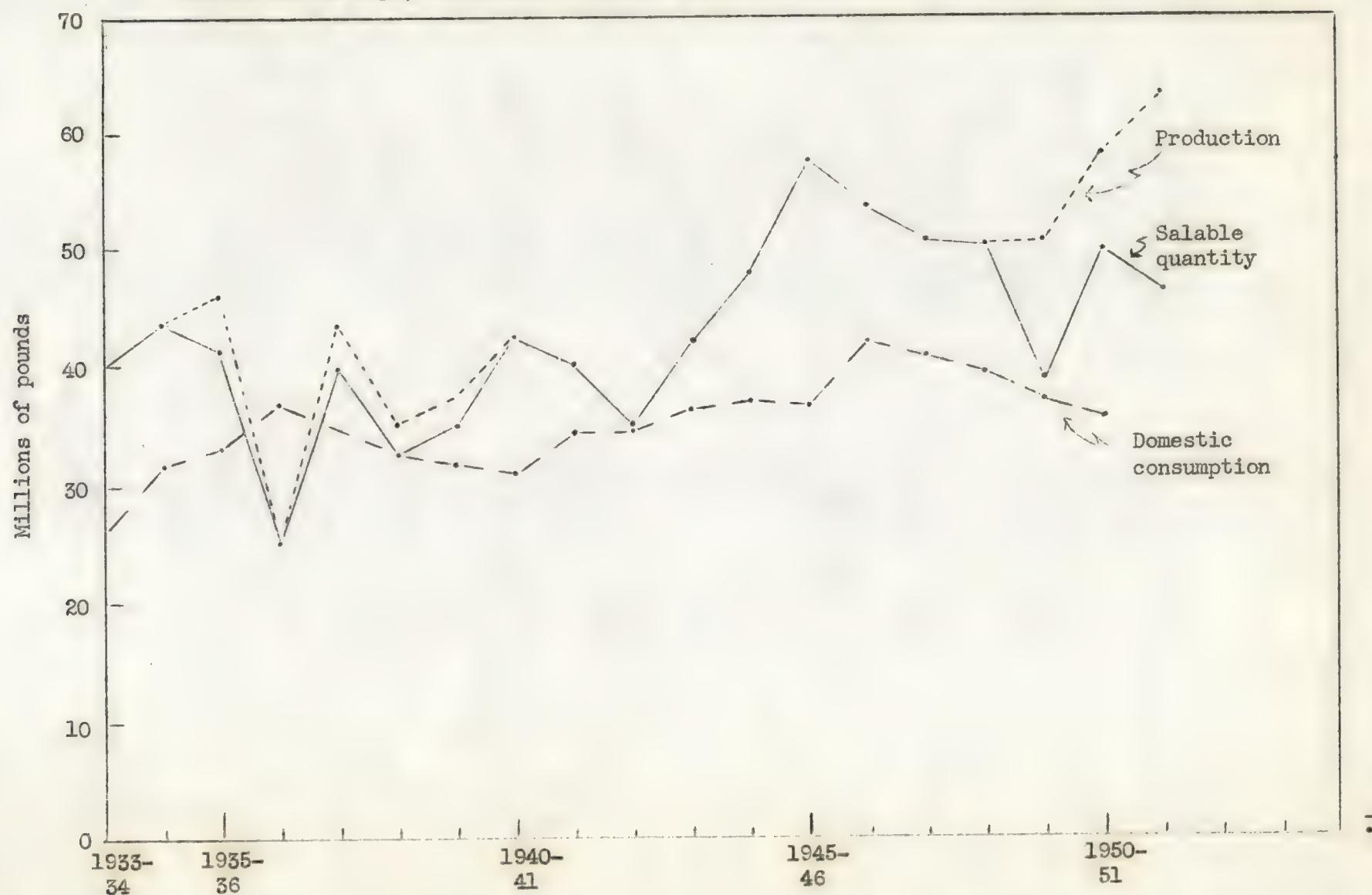
Since hop bales may be stored for several seasons, the utilization of hops can be considered in terms of stocks and flows. In other words, the stock of hops at any point in time is the resultant of the inflow of bales from the growers, and the outflow of bales to the users, both domestic and foreign. There is no precise automatic balance between the inflow and outflow and consequently the stocks on hand September 1 fluctuate from year to year. The range of fluctuation is indicated by September, 1944 stocks at a level of 27 per cent of the 1944-45 domestic consumption, compared with September, 1949 when stocks were 80 per cent of the domestic consumption in 1949-50.

Such fluctuations in stocks have had a bearing on hop prices. At various times and for various growers, the price offered for baled hops has not been high enough to warrant harvesting their crop. At other times, under the provisions of a federal marketing order, only a fraction of each grower's crop has been certified as salable; in such years most of the remainder of the crop produced was left on the vines in order to save handling costs. Figure 2 shows the quantity of hops produced and the quantity salable under the marketing orders compared with domestic consumption.

To supplement domestic production, we import hops from other countries, principally Germany and Czechoslovakia. These imports, in large part, are of

FIGURE 2

United States Hops; Production, Salable Quantity, and Domestic Consumption from 1933-34



special qualities and types. The quantity of hops imported reached a prewar peak of 11 million pounds in 1936-37 when there was a very poor harvest in the United States. Imports declined rapidly in the latter 1930's and were negligible during the war years. Since the end of the war, imports have varied from 3.3 to 5.7 million pounds annually with no discernible trend up or down. (See Figure 3.)

United States exports have exceeded United States imports of hops for most years since 1933-34. The only exception to this occurred from 1935-36 through 1938-39. Since that time there has been a net export balance with the range varying from over 10 million pounds in 1945-46 and 1950-51 to a little over 1 million pounds in 1938-39. The smallest postwar net export balance occurred in 1947-48 and amounted to some $5\frac{1}{2}$ million pounds. (See Figure 3.)

The major outflow from United States hop stocks goes into the production of fermented malt liquors, principally beer. Beer production has increased from about 40 million barrels in 1933-34 to about 90 million barrels in the late forties and early fifties, but the quantity of hops used did not increase proportionately. (See Figure 4.)

During prohibition there had grown up a new generation which seemed to prefer a milder beer. Where one barrel of beer in 1934-35 required, on the average, 0.702 pounds of hops, in 1950-51 only 0.403 pounds were required. Thus, in 1950-51, 36 million pounds of hops were used to produce almost 90 million barrels of beer; while in 1934-35, 32 million pounds were used to produce only 46 million barrels of beer. Beer production has declined about 3 million barrels during the last five years, while domestic hop consumption has declined more than 6 million pounds and reached a postwar low of 36 million pounds in 1950-51.

As a result of the variable inflows (domestic production and imports) and outflow (domestic consumption and exports), United States stocks of hops on hand September 1 have fluctuated from year to year. At the beginning of 1937-38, there was reached the prewar peak of 29 million pounds; those stocks equaled 84 per cent of the amount consumed domestically that season. At the beginning of 1949-50, a postwar peak was reached at 30 million pounds, or 80 per cent of the amount consumed domestically in the same season.

The season average farm price has also fluctuated from year to year in response to changes in the supply and demand situations. From a low of 9.8 cents per pound in 1935-36, the average price increased irregularly to a

FIGURE 3

United States Exports and Imports of Hops from 1933-34

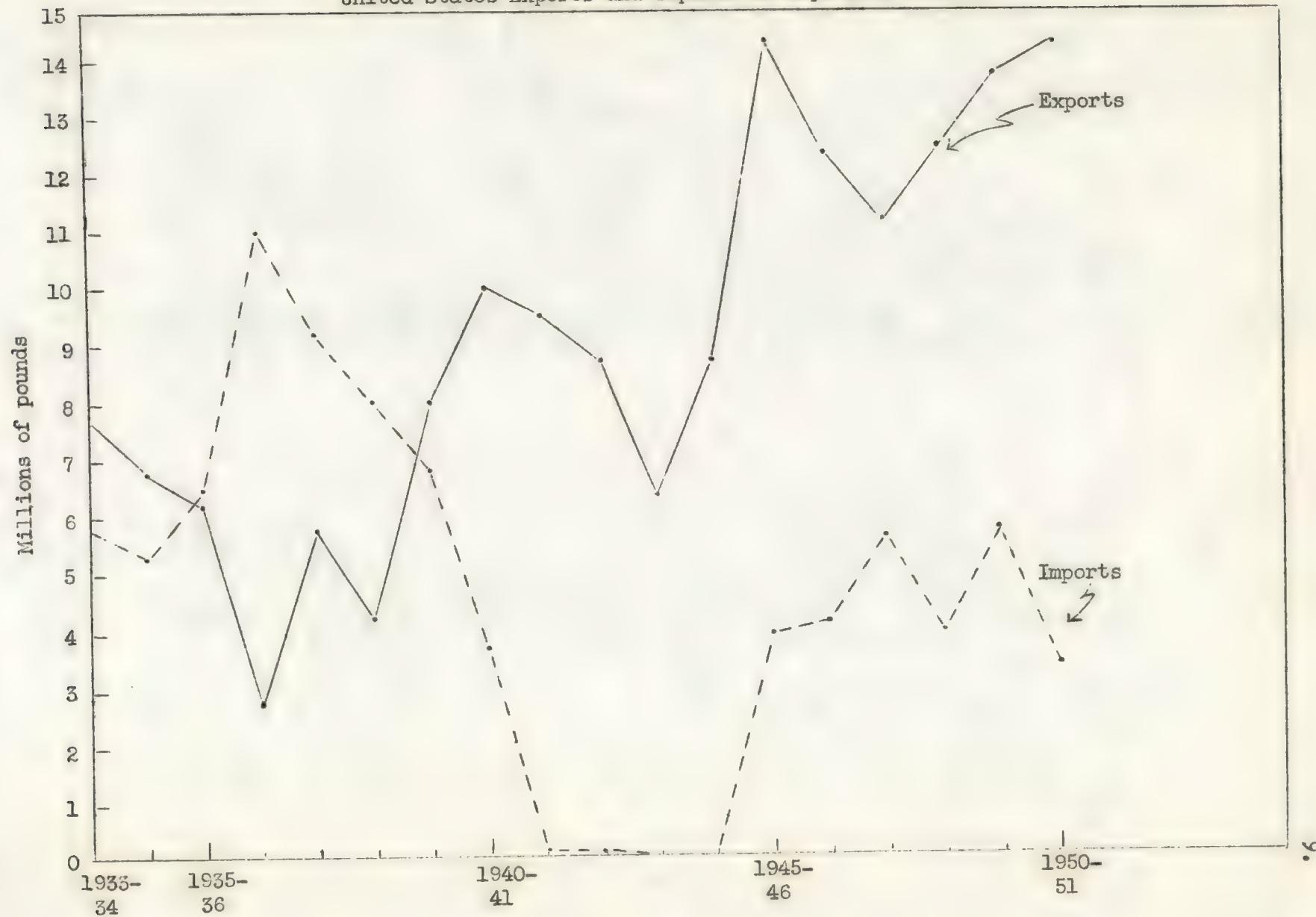
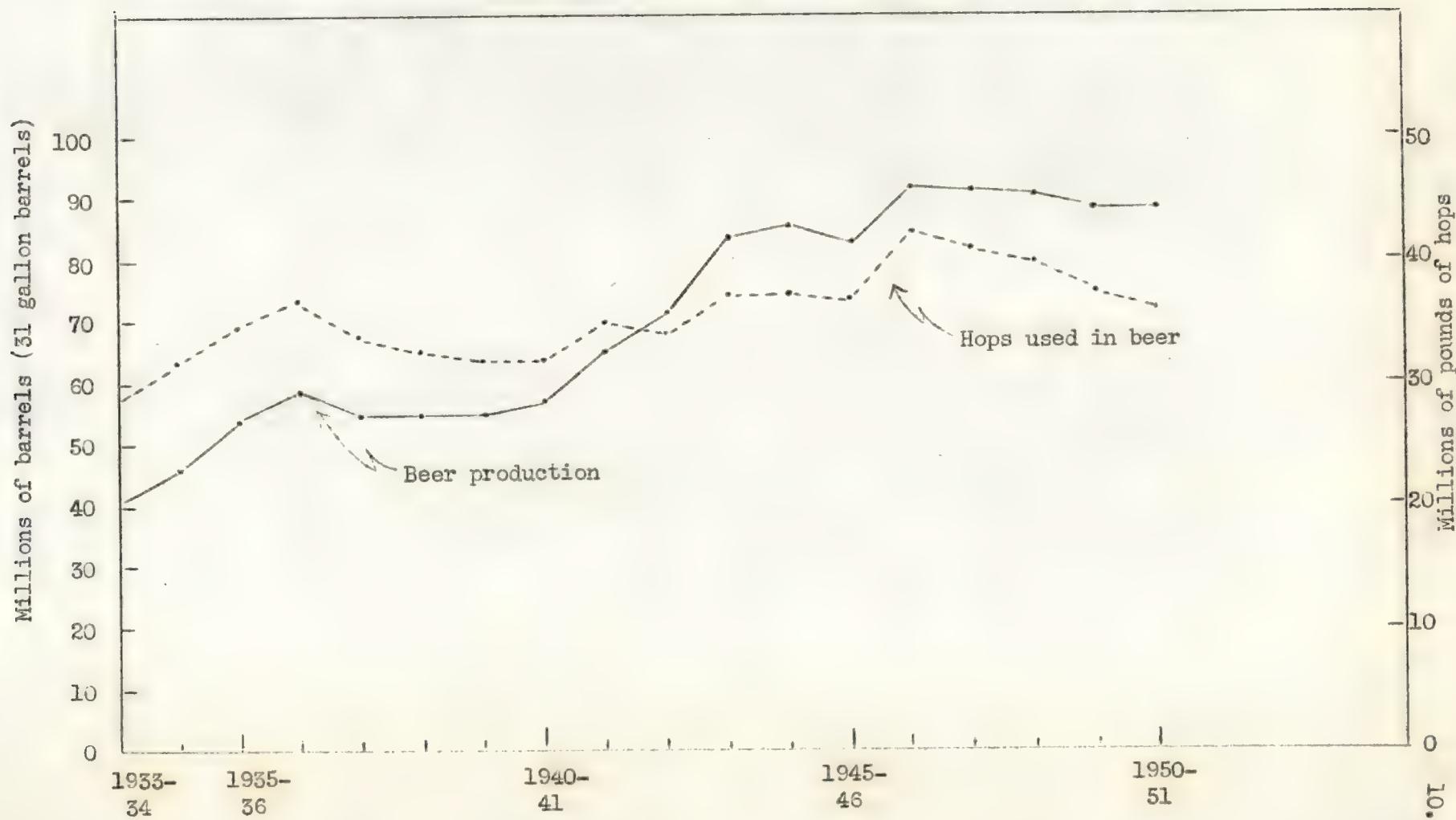




FIGURE 4

United States Production of Fermented Malt Liquors and Hops Used in Production
of Fermented Malt Liquors from 1933-34



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postwar peak of 68.4 cents in 1947-48. Thereafter, the price fell to 55.4 cents in 1948-49 and then recovered to 62.1 cents in 1950-51. Figure 5 summarizes the changes in stocks on hand September 1, season average farm prices, and consumption since 1933-34.

Hop Marketing Agreement

Hop growers, marketing a production the consumption of which is not greatly affected by changes in its price (within the range of market experience) and the production of which is variable from year to year, have been subject to fairly wide price fluctuation. This fluctuation is tempered, however, by the policy of the brewing companies to maintain fairly large stocks relative to annual utilization, increasing them in years of low prices and decreasing them in years of high prices.

Following World War II, production and supply of hops increased more rapidly than did their consumption. This rapid increase in stocks initiated in 1948 a price drop for uncontracted hops from about 65 cents to about 30 cents per pound. Growers and handlers responded with an appeal to the U. S. Department of Agriculture for a Marketing Agreement and Order to control the quantity of hops which could be marketed. This was done to restore the farm price to the neighborhood of its "parity" level. That goal was achieved and the hop industry has operated under a marketing order since 1949. Hops had been marketed under federal marketing agreement and orders before World War II, although they were terminated in 1945.

Since 1949, under the terms of the marketing order, the Secretary of Agriculture has designated the physical quantity of the current crop which can be marketed. The administrative agency which assists the Secretary of Agriculture is the Hop Control Board, composed of 9 grower members, 2 grower-dealer members, 3 dealer members, and 4 brewer members.

The functions of the Hop Control Board are:

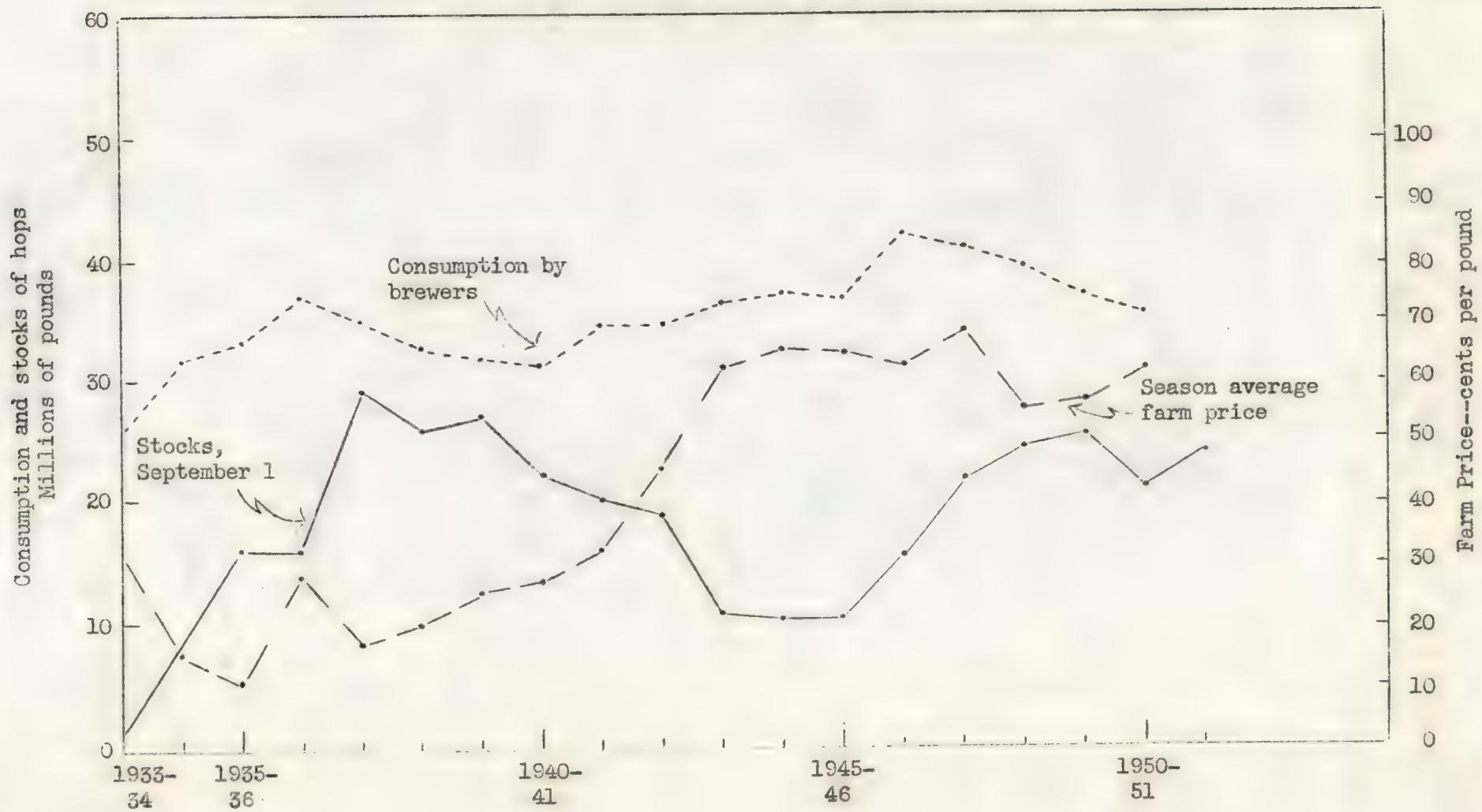
a. to determine the quantity of hops (including hops products) which can be marketed from the crop produced in the current season. This "salable quantity" is based on "consumptive demand."

b. to determine the total quantity of hops available for market from all growers (including any hops unharvested).

c. to determine the percentage ratio between the "salable quantity" and "aggregate production."

FIGURE 5

United States Hops; Stocks, September 1, Consumption
and Season Average Farm Price from 1933-34



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αυτήν την περίοδο πάντας θα γίνεται πιο αποδοτική

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d. to determine the "salable allotment" for each grower by applying the "salable percentage" to each grower's "available quantity."

e. to issue "handling certificates" to cover each grower's "salable allotment."

"In July each year an estimate is made of the following factors:

- (i) Brewers' requirements: The brewer members of the Hop Control Board give their estimate of the barrelage of beer likely to be brewed in the following twelve months. This estimated barrelage is then multiplied by the current average hopping ratio to give the estimated weight of hops likely to be used by brewers. To this is added the small weight of hops to be used by distillers and yeast, malt-syrup and pharmaceutical manufacturers, etc.
- (ii) Probable exports of hops during the following twelve months.
- (iii) Brewers carry-over^{1/} (stocks) of hops at the end of the following twelve months.

The sum of the above three estimates is the consumptive demand.

At the same time the Hop Control Board also estimates:

- (1) Brewers' current carry-over^{1/} of hops.
- (2) Probable imports of hops during the following twelve months.

The sum of these two estimates is then deducted from the consumptive demand and the result is the salable quantity."^{2/}

The salable percentage cannot be determined precisely until final estimates are made. Hence, handling certificates covering up to 90 per cent of the salable allotment based on tentative estimates are issued on request, so that most of the crop can be moved before the final estimates are made. The preliminary estimates are useful also in that many growers only harvest about that fraction of their production which they believe can be sold, and thus save the harvesting costs on the unsalable portion of the crop.

At the present time, there is a diversion privilege in that the handling certificates are negotiable. In recent years some of these have changed hands at prices ranging from 10 to 50 cents per pound of certification rights. There has been some dissatisfaction expressed about the application of this privilege to unharvested hops and the Hop Control Board and the U. S. Hop

1/ For "Brewers' carry-over" should be substituted "total U. S. stocks."

2/ Quoted from: The Hop Industry, Anglo-American Council on Productivity, New York, August, 1951.

zurück. Erst dann kann die Arbeit mit dem Dokument fortgesetzt werden.

zusammenfassende Darstellung der Ergebnisse der Untersuchungen ist ja

equid to University Hospital Hospital

...and the following is the result of the investigation:

19. Any o-american going on project in P.

Growers Association have proposed an amendment which would limit the diversion privilege to harvested hops. It is felt that this might aid in restricting individuals from growing hops to maturity with the primary purpose of obtaining and selling certification rights.

The Hop Control Board provisions are not effective during any year in which the "consumptive demand" is 98 per cent or more of the available crop, or if the estimated average price for the season exceeds the "parity" price. Except for its control of salable quantity and some control over quality (maximum leaf and stem content), the Hop Control Board does not directly enter the marketing process. Most growers sell their product under contract to dealers, usually up to a year in advance of harvest and frequently two or three years in advance. The price is usually set by mutual agreement in the contract so that the grower is protected from price declines but is also prevented from gaining by price increases. Normally, cash advances are made to the grower prior to harvest and delivery.

The salable quantity has been smaller than aggregate production every year since 1949. The amounts withheld (most unharvested) are shown in the following table with average farm prices.

<u>Crop year</u>	<u>Hops withheld</u> <u>million pounds</u>	<u>United States</u> <u>farm price</u> <u>cents per pound</u>
1949-50	11.8	55.4
1950-51	8.3	57.0
1951-52	15.3	62.1

Statistical Price Analysis

Before proceeding with a statistical discussion of the results of the statistical price analysis, a brief review of some major characteristics of the hop market is in order.

Hops have been generally sold on a basis where each grower negotiated with purchasers and they finally arrived at acceptable terms. A large percentage of each crop has usually been contracted for by the dealers during the preceding harvest period or periods, thus the price on this portion of the crop has been set by contract before there is any knowledge of the size of crop or the salable quantity to be certified by the Hop Control Board. On the one hand, the grower has had some idea about his prospective cultural,

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Review of the flora (continued)

picking, drying, and baling costs while, on the other hand, the dealer has had some idea as to transportation costs and the price which might induce brewers to add to their stocks.

At the time of negotiation, there was available to dealers and growers estimates of stocks on hand September 1 or later and the salable quantity from the current harvest. The Hop Control Board, in arriving at a decision as to the salable quantity to recommend to the Secretary of Agriculture, made forecasts of beer consumption, hop exports, and hop imports. Using the forecast of beer consumption and the most recent average hop ratio, a forecast of hop consumption was also made. These estimates and forecasts then led to a forecast of stocks on hand at the end of the current season and the beginning of the next. Stocks on hand September 1, plus salable quantity, plus imports, less exports, less consumption, gave stocks on hand the following September 1.

The average cost of hops per barrel of beer is currently in the neighborhood of 25 cents. This is a very small element in the total cost of producing beer. The hops ratio is chosen primarily with the selling characteristics of the end product in mind, and not with reference to the high or low price of hops.

Since hop movement from growers varies from year to year and only by chance is equal to utilization for the same year, stocks on hand absorb the surplus or cover the deficit. The inventory policy of brewers, then, is an important determinant of the average hop price. In general, the larger their inventory, the less eager are the brewers to add to it. However, inventory policy itself is subject to change from time to time. If the Hop Control Board is successful in stabilizing hop prices, brewers may feel freer about carrying a large inventory. On the other hand, if there is widespread dissatisfaction with the results of the Hops Marketing Order to the extent that its future existence is in doubt, the size of current acreage and production would make dealers and brewers very hesitant about making forward contracts or current purchases, anticipating the possibility of future purchases at substantially lower prices. During periods of international tension, brewers may desire to keep larger stocks on hand than they would if no immediate prospect of conflict were present.

To summarize, growers and dealers negotiate prices on a large fraction of a given crop up to a year or longer in advance of harvest. The negotiated prices cannot be significantly lower than anticipated direct cultural and

harvesting costs or some growers will allow their yards to remain idle the following season and incur only the bare minimum costs required to keep the yard productive. The prices, on the other hand, cannot be so high that dealers see no chance to induce the brewers to add to their stocks at a price profitable to the dealers. Thus, a forecast of the size of brewers' stocks and inventory policies is useful to the dealer in his price negotiation.

After reviewing some of the more important marketing practices, we may now turn to consideration of how the behavior of prices is related to various market determinants.

It may first be noted that the statistical price analysis is that part of this report which is of prime interest to the hop marketing industry. The need for such a statistical price analysis prompted the request which resulted in this report. Yet, the statistical price analysis, by itself, is much less meaningful than when it is interpreted and used in a particular setting such as operation of the Hop Marketing Order.

For use in administration of the Hop Marketing Order, the industry and/or its representatives are interested in suggestions for appropriate lines of action and the potential results of such action. This applies particularly to the price effects which may be expected from manipulation of the supply and inventory position of the industry. Thus, the statistical price analysis may be used in conjunction with other tools to obtain an indication of the price effects likely to result from alternative lines of action by the industry. It must be emphasized, though, that the statistical price analysis does not replace the need for business judgment. Used properly, the analysis can aid in arriving at sound decisions, but it cannot by itself dictate decisions.

Before proceeding further with a review of the statistical analysis of the price for United States hops, it is necessary to set forth certain characteristics of the data analyzed. From a statistical viewpoint, it is usually desirable to have a fairly long series of observations with which to work, taken from a period which is fairly homogeneous. With respect to hops, estimates of prices, production, consumption, and stocks were available for a period beginning as far back as 1920-21, but the situation in the twenties and early thirties was radically different from the situation following the resumption, in 1933, of the production of beer stronger than one-half per cent of alcoholic content. Available statistical techniques are not well suited to account for the type of change that occurred in 1933 when prohibition was repealed.

During the years of World War II, government programs such as price control and rationing and the shortage of durable consumer goods tended to distort the peacetime "normal" relationships between economic variables. On this account, it is often the practice to exclude the data of the war years from statistical analyses. However, in this case, if the years 1941-42 to 1945-46 were excluded, there would remain only the observations from thirteen seasons, an insufficient number to allow reliable estimates. Also, from the viewpoint of hop marketing, it was believed that the situation was less "abnormal" than with many other goods. Thus, although with some misgivings, it was decided to use the data from the entire period 1933-34 to 1950-51 with the thought that, in this particular case, the distortion of the war period would have only a minor effect on the statistical results.^{1/}

With minor exceptions, the entire period studied has been one of increasing prices. It is a commonplace occurrence that during a period of rising prices, especially if this is better foreseen by dealers and brewers, it is good business policy to carry large inventories and to make forward contracts at prices substantially lower than prices will be at the time of delivery. Consequently, it must be remembered that the reverse situation becomes true if prices are expected to fall drastically. Even if price stability is the expectation held by dealers and brewers, over a period of several years brewers might well decide that a smaller inventory is desired than would be the case if prices were expected to rise.

The objective of the statistical analysis was to find an explanation of the determination of United States season average farm price for hops; such an explanation, to be usable, should be fairly simple but still acceptable from both the statistical and economic points of view. Many of the considerations leading to the particular explanations chosen have already been discussed. Based on economic and statistical considerations, summarized at the beginning of this section, and on other statistical results summarized in Table 6, the principal determinants of the United States season average farm price during the period covered have been the size of stocks on

^{1/} Several analyses were made of data from the period 1923-24 to 1950-51, excluding the war years. Some of these results are given in Table 6, (equation IV a). It is believed, however, that the analyses based on the period 1933-34 to 1950-51 including the war years, give superior results from the view of reflecting current institutions and relationships.

hand September 1 and total United States personal consumption expenditures. The size of stocks on hand September 1 reflects the strength of the hop inventory position of brewers, and incorporates their expectations as to desirability of carrying larger or smaller stocks. Total United States personal consumption expenditures reflect the amount of money consumers have spent for goods and services, and thus is related to the amount of disposable income available to consumers and their views as to how much of that income should be expended. Personal consumption expenditures, thus, are to a great extent correlated with general business conditions and the level of national employment and income.

The statistical analysis, then, summarizes the average relationships which have existed between the United States season average farm price, the size of stocks on hand September 1, and United States personal consumption expenditures during the period 1933-34 through 1950-51.

The United States season average farm price is estimated by the United States Department of Agriculture and represents the price which, when multiplied by the quantity of hops sold by growers, would yield the total gross money returns growers received. Thus, the farm price is influenced to a large extent by the prices determined under forward contract but is also influenced by the prices paid for uncontracted hops.

The size of stocks on hand September 1 is estimated and reported by the Hop Market Review issued by the Federal-State Market News Service (San Francisco, California) and includes stocks held by growers, dealers, and brewers.

United States personal consumption expenditures are estimated by the Department of Commerce and reported monthly in its Survey of Current Business.

Stocks on hand September 1 may be expressed in two different ways--in millions of pounds or as a ratio between the quantity on hand and the quantity consumed during the following season. For example, the stock on hand September 1, 1950 was 23.7 million pounds. Consumption during 1950-51 was 35.8 million pounds. Thus, the stock on hand September 1 could also be expressed as 66.3 per cent of the consumption in the following season.

Both methods of measuring the stock on hand were used and the result of each analysis is given below. These two sets of results should not be viewed as separate "explanations" of the price determination; rather, they are two slightly different ways of expressing the same economic relationships.

The average relationships of United States season average farm price to stocks on hand September 1 and United States personal consumption expenditures may be summarized as follows:

for these areas of concern to include off-shore and offshore oil/gas resources, marine fisheries, coastal and marine ecosystems, and marine biodiversity. The marine environment is a complex system of interconnected components, each with its own unique characteristics and dynamics. The marine environment is also a dynamic system, with significant changes occurring over time due to natural and human-induced factors. The marine environment is a delicate balance between natural and human-made processes, and any disruption to this balance can have significant impacts on the marine ecosystem.

Marine ecosystems are highly sensitive to changes in the environment, and any disruption to the balance between natural and human-made processes can have significant impacts on the marine ecosystem. The marine environment is a delicate balance between natural and human-made processes, and any disruption to this balance can have significant impacts on the marine ecosystem.

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(1) A change of 1 million pounds of stocks on hand September 1, considered by itself, was on the average accompanied by a change in the opposite direction of about 1 cent per pound in the United States season average farm price of hops of all marketed grades (shown in Figure 6a).

(2) An increase of 10 per cent in United States personal consumption expenditures, considered by itself, was on the average accompanied by an increase of about 10 cents per pound in the United States season average farm price of hops of all marketed grades (shown in Figure 6b).

The relations described in (1) and (2), above, are included in an equation which measures the relation of the price to the stocks and national expenditures; the equation reflects the price as a resultant of the interaction of stocks and national expenditures. In other terms, changes or variations in stocks and/or national expenditures are reflected by associated changes in the farm price.

The derived statistical equation (Id in Table 6) can be used to calculate an estimated price for each year. Figure 7 compares such an estimated price, based on the statistical equation, with the actual price for each year.

We may turn to the alternative formulation of the statistical price analysis. Rather than considering September 1 absolute stocks as such, we now consider relative stocks or the September 1 stocks as a percentage of the hop consumption in the following year. Thus, the price change is considered to be determined by the combined changes in relative stocks and national consumption expenditures.

The average relationships of the United States season average farm price to stocks on hand September 1, expressed as a per cent of consumption in the following season, and United States personal consumption expenditures may be summarized as follows:

(1) A change of 10 percentage points in the relative stocks on hand September 1, considered by itself, was on the average accompanied by a change in the opposite direction of about 3.5 cents per pound for the United States season average farm price for hops of all marketed grades (Figure 8a).

(2) An increase of 10 per cent in United States personal consumption expenditures, considered by itself, was on the average accompanied by an increase of about 10 cents per pound for the United States season average farm price of hops of all marketed grades (Figure 8b).

Estimated prices based on this formulation are compared to actual prices in Figure 9. It should be noted that the degree of correspondence between

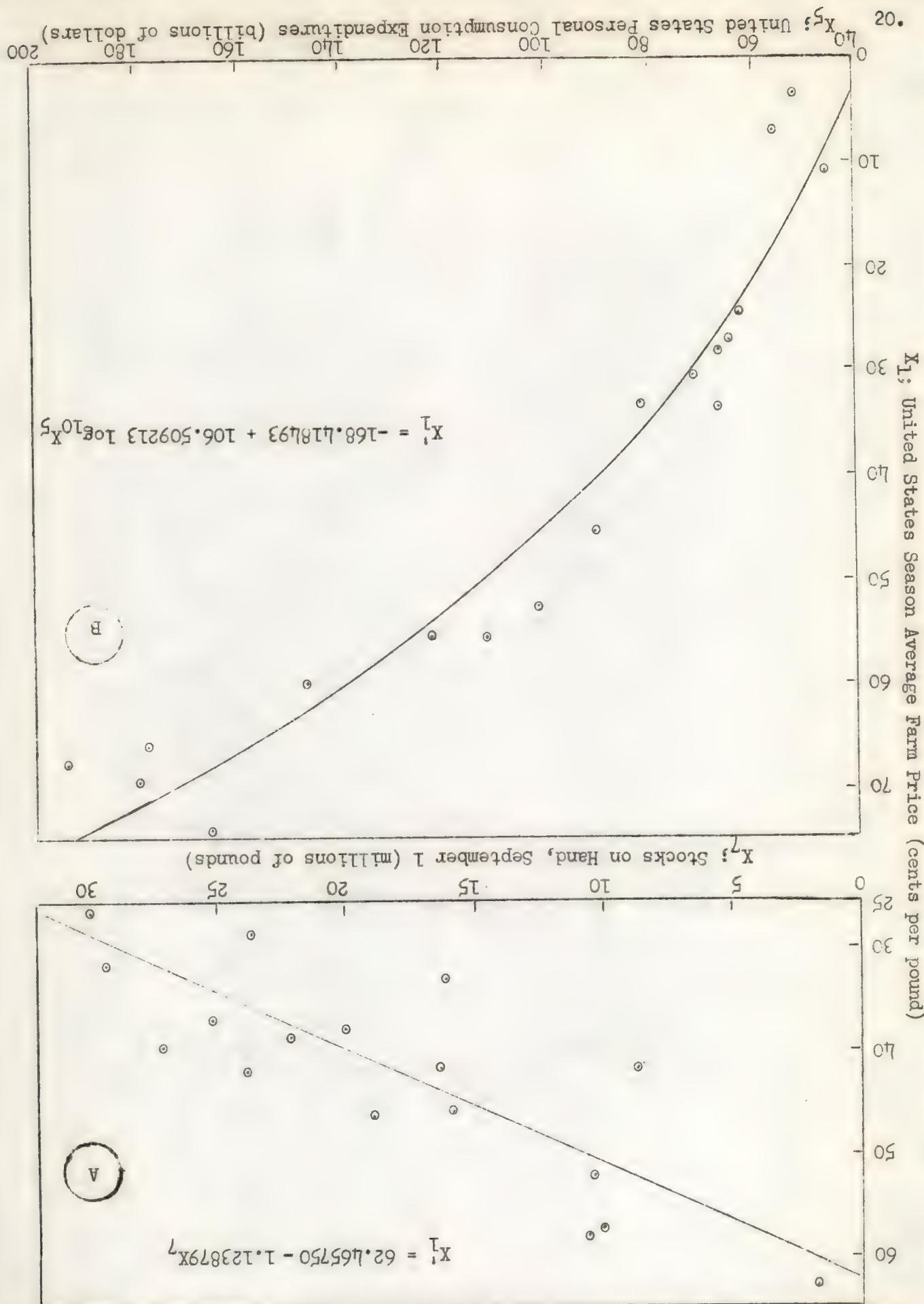


FIGURE 6
Net Statistics of United States Farm Price of Hops to United States Stocks (September 1) and Personal Consumption Expenditures (Based on Equation 1d, Table 6)

FIGURE 7

United States Hops; Season Average Farm Prices, Actual and Estimated from 1933-34
(Estimated Prices Based on Equation Id, Table 6)

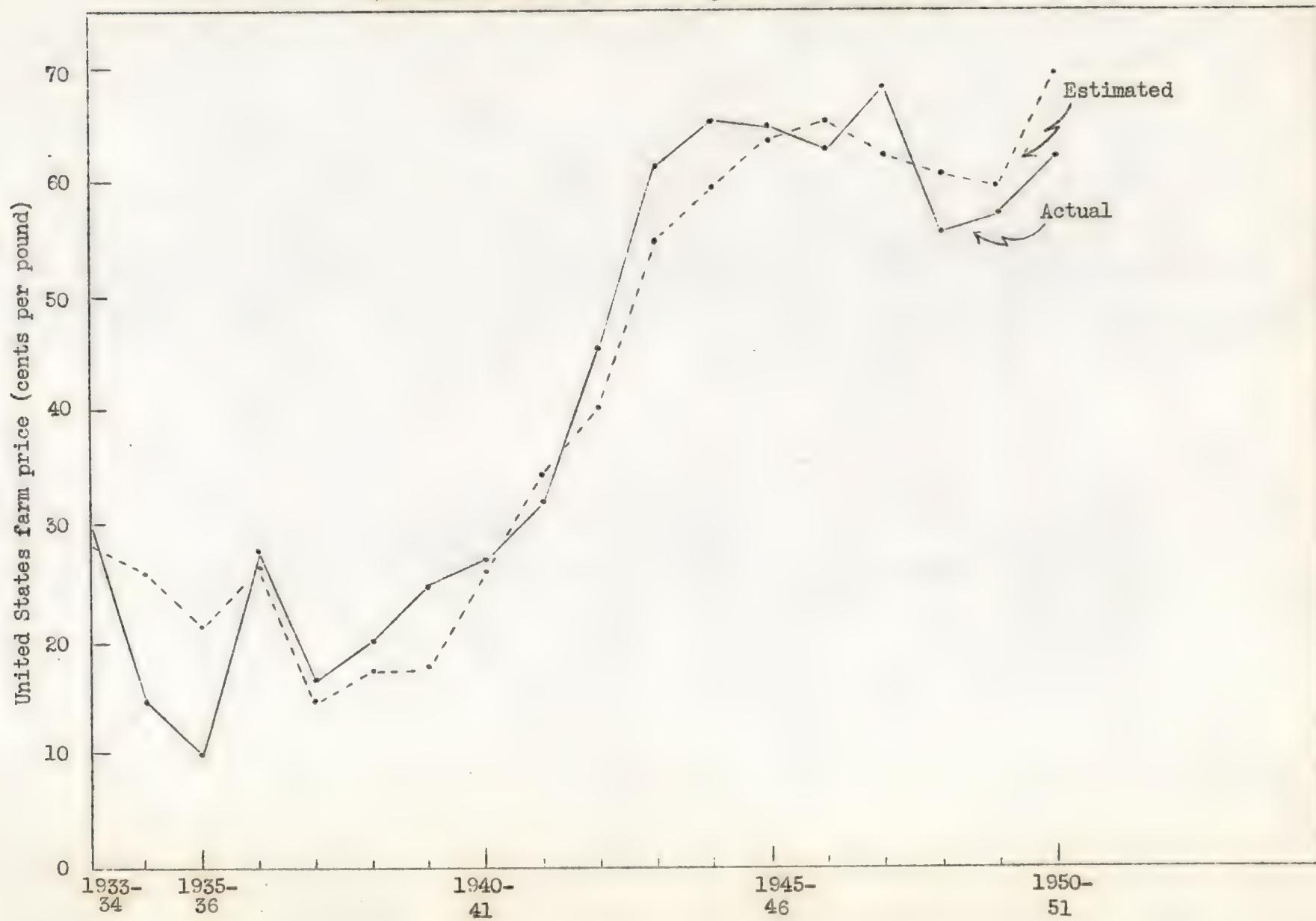


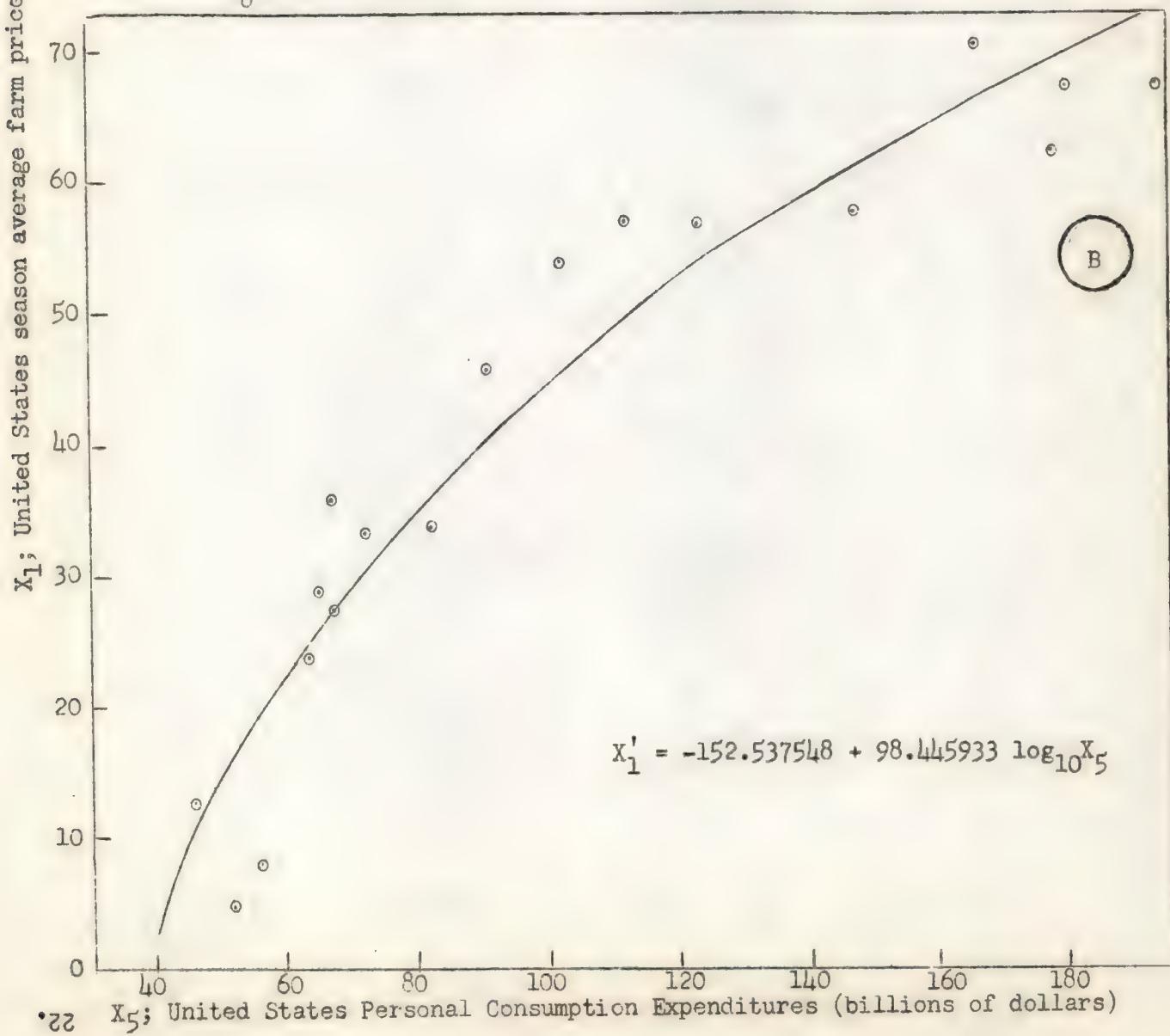
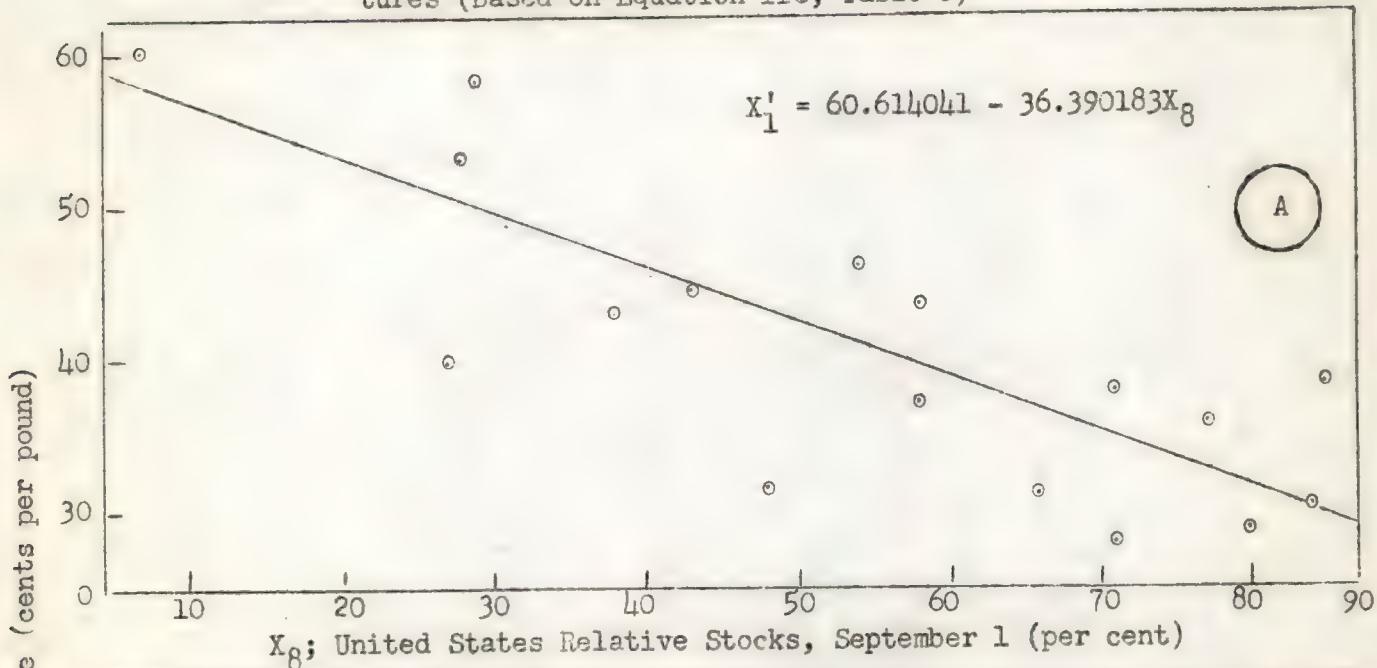


FIGURE 1. *Relationship between the number of species and the number of individuals*

FIGURE 1

FIGURE 8

Net Statistical Relations of United States Farm Price of Hops to United States Relative Stocks (September 1) and Personal Consumption Expenditures (Based on Equation IIIe, Table 6)



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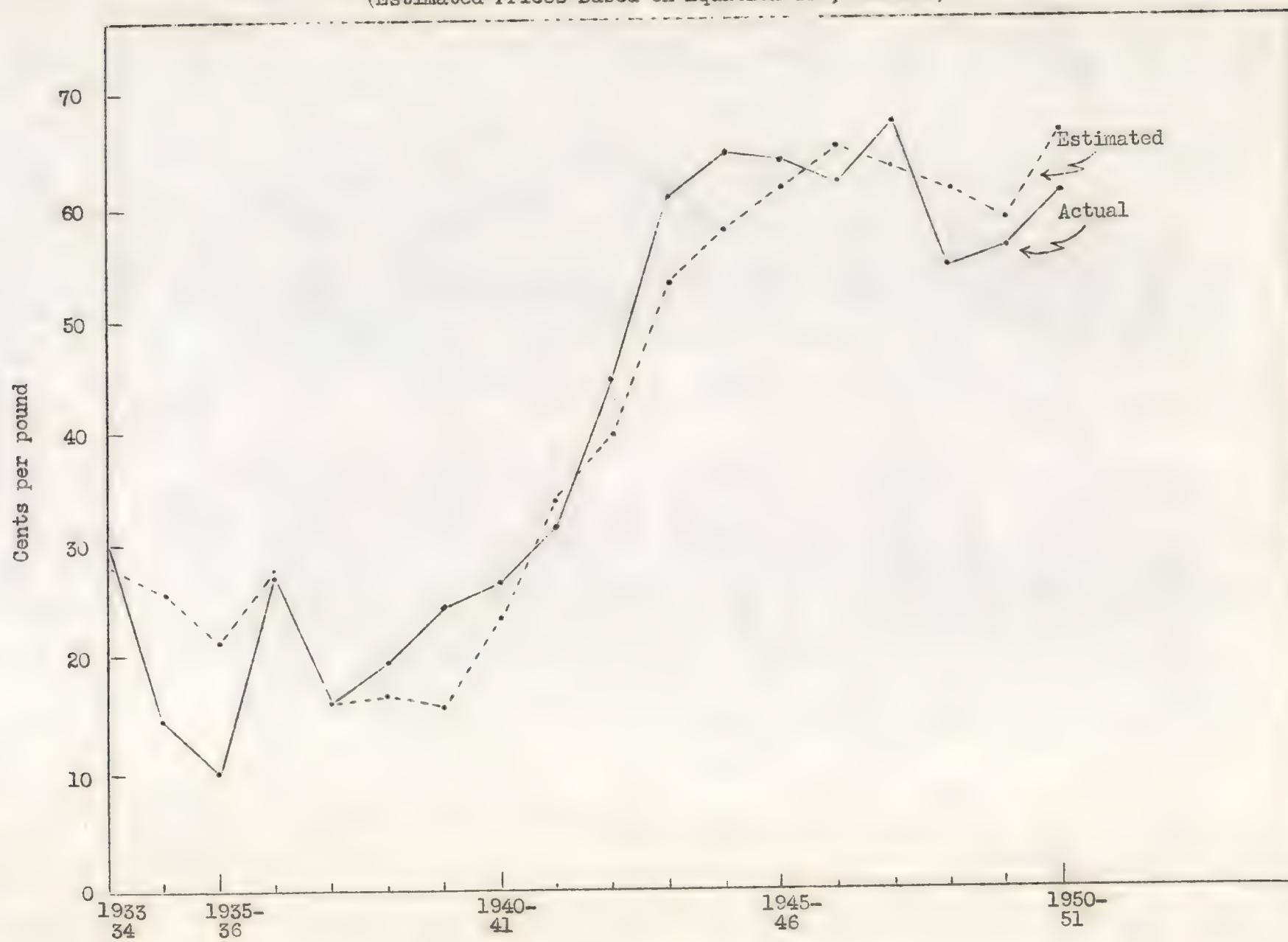
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FIGURE 9

United States Hops; Season Average Farm Prices, Actual and Estimated from 1933-34
(Estimated Prices Based on Equation IIe, Table 6)



actual and estimated price is not much different in the second analysis compared with the first. Another way of putting the matter is to say, as we have earlier, that the two analyses are only different ways of looking at the same thing. Either equation may be used in the work of the Hop Marketing Board.

It must be emphasized here that the statistical relations of price to stocks and national personal consumption expenditures, summarized above, are average relationships; they may not apply to any particular season. To the extent that average relationships which have tended to prevail in the past continue to hold, the relationships may be helpful in analyzing alternative marketing potentialities. Yet, always it must be recognized that the statistical relations and equations are tools for use in market analysis, and not mechanical forecasters. Used with judgment, the tools can be helpful; but they are not a substitute for business judgment. These characteristics of the statistical relations and equations must be borne in mind when they are considered and used; also, should be borne in mind the fact that new and uncommon situations may arise in any season, calling for judicious and appropriate modification of the statistical relations as they are used.

We may now illustrate the manner in which the members of the Hop Control Board might use the results of this statistical price analysis. For this purpose we shall use the analysis with absolute stocks, and we shall consider how the Board might use the analysis to help arrive at its decision as to the salable quantity to be authorized for the following season. Later, we shall consider the question as to what the average farm prices would likely have been had there been no diversion of hops the past several seasons.

The objective of the Hop Control Board, operating under the Hop Marketing Agreement and Marketing Orders from the Secretary of Agriculture, is to maintain the price of hops at specified levels, generally approaching the "parity" level. The "parity" prices reported for hops in Agricultural Prices for July, 1951 and January, 1952 were, respectively, 74.4 cents per pound and 74.6 cents per pound. United States season average farm price for 1950-51 was 62.1 cents per pound, while current reports in the Hop Market News indicate that the 1951-52 average price may be even lower.

The Hop Control Board can affect the average price of hops by its recommendation in July to the Secretary of Agriculture that he permit only a certain amount from the following harvest to be salable. It is obvious, however, that this decision can have little effect on the price paid for the hops harvested

and baled in the following several months if most of this harvest has already been contracted for at a previously set price. However, there is a delayed effect since the quantity moving to brewers following this harvest will control to a large extent the stocks that brewers and others carry over at the end of the season into the beginning of the next. We have indicated that stocks on hand at the end of the season can be projected by adding to current stocks September 1 the current salable quantity and estimated imports and then subtracting estimated consumption and exports. This year-end stock position enters, in an important way, in the determination of the season average price for that season; for with this projected stock position and national personal consumption expenditures, the season average farm price may be estimated by the statistical equation noted above.

There are at least two approaches that the members of the Hop Control Board can take to this problem of raising marketing price to some particular level such as, for example, "parity." They can compare the most recent season average farm price to its relevant parity level. If the farm price is significantly lower than "parity," they can include in their estimate of "consumptive demand" a quantity for stocks on hand at the end of the next season which is smaller than current stocks.

Such procedure would be followed with the thought in mind that, on the average, a decrease in stocks of 1 million pounds has been accompanied by a net increase in season average farm price of about 1 cent per pound. Thus, alternative projected stock levels may be considered in terms of their effect on the farm price.

The Hop Marketing Board may also take a slightly different approach. It might select as a goal for the following year a particular price, then set the current salable quantity at that level which, in conjunction with anticipated United States personal consumption expenditures, would lead to the desired price. This procedure could also utilize the statistical price analysis equations considered earlier.

Market experience indicates that variation in the farm price for hops is highly correlated with associated variation in September 1 stocks and national business conditions as reflected by personal consumption expenditures. This latter factor may be estimated for short periods ahead; and the other factor--September 1 stocks--can be influenced by the Board. Thus, the Hop Marketing Board has the means for going a long way toward affecting the farm price for

hops; and with statistical equations as summarized here, the Board may evaluate the price effects of various alternative levels of supply control from no restrictions on marketing to that necessary to attain some specified price.

Concluding Comments

The evidence summarized in the preceding sections suggests that the most important price-determining variable subject to control, even though only indirectly, by the Hop Control Board is the stock of hops on hand September 1. The operation of the Hop Control Board requires that an estimate be made of "consumptive demand" for the following season. This includes stocks to be on hand September 1, consumption by breweries and others, and exports. The Hop Control Board has no direct influence on consumption or exports, but can decide what level of stocks it believes would be desirable. The sum of the current stocks and estimated imports would then be deducted from the consumptive demand to give the current salable quantity recommended by the Hop Control Board to the Secretary of Agriculture. It should be clear that the primary effect of the Board's control of the salable quantity for one harvest will be on the price received for the following harvest; this is especially so if the custom of forward-price contracts is continued.

The question is continually raised, what would the season average farm price have been the past few years if there had been no control of the salable quantity? Of course, there is no conclusive answer possible to this question, but the statistical price analysis above does lend some light on the subject. United States average farm price would likely have been lower without the control than it actually was with the control program. A lower price might have caused a slight increase in domestic consumption and perhaps a greater increase in exports. The lower price probably would have reduced somewhat the actual amount produced and/or harvested.

For the sake of simplification, however, assume that the same amount would have been produced, that all of it would have been harvested and sold, and that consumption, exports, and imports would have remained the same. These assumptions would concentrate the effect of the entire change on the single variable, stocks on hand September 1. The amount withheld in 1949-50 would then be added to the stocks on hand September 1, 1950 to give a total of 35.5 instead of 23.7 million pounds. This would have been almost as great as total consumption

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...and the best of the best are the ones that have been around the longest.

for 1949-50 and would have been the largest stock ever recorded. If, in addition, the diversion in 1950-51 had not taken place, the stock on hand September 1, 1951 would have been 46.6 million pounds, a figure much larger than consumption for 1951-52.

Under these conditions, the estimated price for 1950-51 would have been about 56 cents instead of 69.6 cents per pound and for 1951-52 it would have been about 48 cents per pound. The actual price for 1950-51 was about 8 cents below the estimated price and it is entirely conceivable that the 1951-52 price could have fallen as low as 40 cents per pound had there been no diversion in the preceding years. Of course, a price at this level would automatically have led to considerable diversion since it is below cultural costs per pound for some producers.

One of the goals of the hop control program and the yardstick by which its success or failure (in a legislative sense) is often measured is the achievement of "parity" price for the hop growers. The program, if not always successful in achieving "parity" price, has at least made the price higher in some seasons than it would have been without the control program. However, there is evidence that, at the same time, the higher prices have induced some growers to expand acreage and production and have induced new growers who were previously producing other crops to begin producing hops. This has led to an expansion of production which, in combination with a static or decreasing consumption, has resulted in continuation of a problem for whose solution the control program was originally introduced.

Because of erratic yields, the brewers and others desire to carry fairly substantial stocks. For those years when yields are extremely large, some control over salable quantity may be desirable to avoid superabundant stocks forcing down the price erratically for the following seasons. These seasons where control of salable quantity is required, however, should be the exception rather than the rule.

TABLE 1

Acreage, Production and Yield of United States Hops from 1933-34

Season	Acreage harvested	Production ^{a/}	Yield	Indexes ^{b/}		
				Acreage	Production	Yield
	1	2	3	4	5	6
			1,000 pounds	pounds per acre		
1933-34	30,300	40,285	1,330	90.8	106.9	118.4
1934-35	37,100	43,934	1,184	111.1	116.6	105.4
1935-36	39,100	46,433	1,188	117.1	123.2	105.8
1936-37	31,000	25,281	816	92.9	67.1	72.7
1937-38	34,300	43,955	1,281	102.8	116.6	114.1
1938-39	31,500	35,288	1,120	94.4	93.6	99.7
1939-40	31,000	37,462	1,208	92.9	99.4	107.6
1940-41	32,800	42,846	1,306	98.3	113.7	116.3
1941-42	34,800	40,380	1,160	104.3	107.2	103.3
1942-43	34,600	35,153	1,016	103.7	93.3	90.5
1943-44	32,200	42,448	1,318	96.5	112.6	117.4
1944-45	37,190	48,146	1,295	111.4	127.8	115.3
1945-46	40,940	57,614	1,407	122.6	152.9	125.3
1946-47	40,940	53,751	1,313	122.6	142.6	116.9
1947-48	39,840	50,786	1,275	119.4	134.8	113.5
1948-49	40,420	50,464	1,248	121.1	133.9	111.1
1949-50	37,550	50,796	1,353	112.5	134.8	120.5
1950-51	38,700	58,351	1,508	115.9	154.8	134.3
1951-52	41,200	63,239	1,535	123.4	167.8	136.7

a/ Includes quantities harvested and salable, harvested and not salable due to marketing agreement, unharvested due to economic reasons. Quantities not harvested and/or not salable are estimated as:

Season	1,000 pounds	Season	1,000 pounds
1935-36	4,851	1949-50	11,796
1936-37	—	1950-51	8,351
1937-38	3,890	1951-52	16,739
1938-39	2,501		
1939-40	2,224		

b/ Averages for 1935-36 through 1939-40 equal 100. Averages for this period were: Acreage, 33,380 acres; production, 37,684 pounds; yield, 1,123 pounds per acre.

Sources:

1950-51 and 1951-52: Federal State Market News Service, Hop Market Review, San Francisco, November 15, 1951.

1944-45 through 1949-50: U.S. Bureau of Agricultural Economics, Revised Estimates, 1944-1949, Statistical Bulletin No. 108, Washington, D.C., March, 1952.

1939-40 through 1943-44: U.S. Bureau of Agricultural Economics, Field and Seed Crops, Acreage, Yield and Production, Revised Estimates, 1939-1944, Washington, D.C., April, 1947.

1933-34 through 1938-39: U.S. Bureau of Agricultural Economics, Hops: Revised Estimates of Acreage, Yield, and Production, 1915-1941, Washington, D.C., October, 1943.

TABLE 2

United States Hops, Production, Salable Quantity, and Domestic Consumption
and United States Hops Imports from 1933-34.

Season ^{a/}	Production	Salable quantity	Domestic consumption	Exports	Imports
				4	5
	1,000 pounds				
1933-34	40,285	40,285	26,235	7,700	5,761
1934-35	43,934	43,934	31,773	6,772	5,257
1935-36	46,433	41,582	33,316	6,184	6,535
1936-37	25,281	25,281	37,005	2,719	11,026
1937-38	43,955	40,065	34,875	5,784	9,189
1938-39	35,288	32,787	32,746	4,183	8,053
1939-40	37,462	35,238	31,927	7,991	6,814
1940-41	42,846	42,846	31,155	10,030	3,736
1941-42	40,380	40,380	34,512	9,459	154
1942-43	35,153	35,153	34,833	8,673	111
1943-44	42,448	42,448	36,515	6,311	—
1944-45	48,146	48,146	37,239	8,685	—
1945-46	57,614	57,614	36,834	14,288	3,859
1946-47	53,751	53,751	42,281	12,261	4,126
1947-48	50,786	50,786	41,158	11,081	5,581
1948-49	50,464	50,464	39,704	12,376	3,900
1949-50	50,796	39,000	37,325	13,738	5,683
1950-51	58,351	50,000	35,750	14,276	3,321
1951-52	63,239	46,500			

a/ All figures for season September through August except column (3) which is July through June for years 1933-34 through 1945-46.

Sources: Cols. 1 and 2: See Table . Cols. 3, 4, 5: 1933-34 through 1945-46, U. S. Bureau of Agricultural Economics, Outlook for Hops From the Pacific Coast, Table 10, Washington, D. C., November, 1948. Since 1946-47, Federal-State Market News Service, Hop Market Review, San Francisco, California, Nov. 15, 1951.

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Based on the following sentence, choose the most likely meaning of the underlined word.

1920-1921

TABLE 3

United States Hops, Stocks, September 1, Consumption and Season Average Farm Price, 1933-34 through 1950-51.

Season	Stocks	Domestic	Stocks as	Season
	September 1	consumption	per cent of	average
	1	2	consumption	farm price
		1,000 pounds	per cent	cents per pound
1933-34	1,789	26,235	6.8	30.4
1934-35	8,658	31,773	27.2	14.5
1935-36	16,061	33,316	48.2	9.8
1936-37	15,825	37,005	42.8	27.4
1937-38	29,294	34,875	84.0	16.2
1938-39	25,173	32,746	76.9	19.7
1939-40	27,069	31,927	84.8	24.5
1940-41	22,124	31,155	71.0	26.8
1941-42	20,008	34,512	58.0	31.9
1942-43	18,892	34,833	54.2	45.2
1943-44	10,735	36,515	29.4	62.2
1944-45	10,110	37,239	27.1	65.3
1945-46	10,389	36,834	28.2	64.9
1946-47	16,266	42,281	38.5	62.7
1947-48	23,770	41,158	57.8	68.4
1948-49	28,250	39,704	71.2	55.4
1949-50	29,940	37,325	80.2	57.0
1950-51	23,700	35,750	66.3	62.1
1951-52	26,500			

Sources:

Cols. 1 and 2: From 1933-34 through 1945-46, U. S. Bureau of Agricultural Economics, Outlook for Hops from the Pacific Coast, Washington, D. C., November, 1948, Table 10. From 1946-47 to 1951-52, Federal-State Market News Service, Hop Market Review, San Francisco, November 15, 1951.

Col. 3: Col. 1 divided by Col. 2 times 100.

Col. 4: From 1933-34 through 1947-48, U. S. Production and Marketing Administration, Statistics of the United States Hop Industry, Table IX, Washington, D. C., November 29, 1948. From 1948-49 through 1950-51, U. S. Bureau of Agricultural Economics, Season Average Prices and Value of Production, Principal Crops, by States, 1948 and 1949, 1949 and 1950, 1950 and 1951. Washington, D. C.

matqoři jasorec (jaročí) k-žatec poučení
-čeká, čeká muzikál zemědělník rokosek hra

TABLE 4

United States Production of Fermented Malt Liquors,
 Hops used in Production of Fermented Malt Liquors and
 Hopping Rate by Crop Years from 1933-34

Crop year beginning September	Production of fermented malt liquors	Hop used in production of fermented malt liquors	Hopping rate
	1 1,000 barrels	2 1,000 pounds	3 pounds per barrel
1933-34	40,495	28,836	0.712
1934-35	45,873	31,658	0.690
1935-36	53,872	34,516	0.641
1936-37	58,458	36,608	0.626
1937-38	54,551	33,793	0.619
1938-39	54,475	32,485	0.596
1939-40	54,790	31,670	0.578
1940-41	56,835	31,831	0.560
1941-42	64,980	34,806	0.536
1942-43	71,358	34,024	0.477
1943-44	83,854	36,983	0.441
1944-45	86,494	37,240	0.430
1945-46	82,869	36,834	0.444
1946-47	91,530	42,395	0.463
1947-48	91,084	40,927	0.449
1948-49	90,628	39,789	0.439
1949-50	88,515	37,437	0.423
1950-51	88,698	35,987	0.406

a/ Includes small amounts of hop extract.

Sources:

1933-34 through 1946-47: U. S. Production and Marketing Administration, Statistics of the United States Hop Industry, Table VIII, November, 1948.

1947-48 through 1950-51: Col. (1), U. S. Bureau of Internal Revenue, Statistics on Fermented Malt Liquors and Cereal Beverages, 1948, 1949, 1950, 1951, Washington, D. C.; Col. (2) U. S. Bureau of Internal Revenue, Comparative Statistics on Domestic Fermented Malt Liquors, monthly issues, 1947, 1948, 1949, 1950, 1951; Col. (3): Col. (2) divided by Col. (1). Washington, D. C.

،امروزیم ایشان بهترینش باشند و اینکه هر کسی
با این این ایشان همراهی نماید اینکه ایشان را بخواهد
که این ایشان را بخواهد

TABLE 5
Basic Data Used in Regression Analyses^{a/}

Season	Season average farm price	Domestic con- sumption	Movement from growers to domestic trade	Domestic trade supply excluding trade carry-in	United States personal con- sumption ex- penditures	Index of United States nonagri- cultural income, average 1935-1939=100	United States stocks on hand, Sept. 1	Relative stocks on hand Sept. 1 (col. 7/ col. 2)	Relative stocks on hand Sept. 1 lagged one year
	1	2	3	4	5	6	7	8	9
	cents per pound		millions of pounds		billions of dollars		millions of pounds		
1923-24	18.8	3.8	9.9	10.5		103			
1924-25	10.3	3.2	12.1	12.6		106			
1925-26	21.8	3.4	14.7	15.3		113			
1926-27	23.1	3.1	17.0	17.5		116			
1927-28	22.9	3.1	18.9	19.7		117			
1928-29	19.3	2.7	20.4	21.1		122			
1929-30	11.4	2.6	25.7	26.6		118			
1930-31	14.8	2.2	22.1	23.1		103			
1931-32	13.8	1.8	22.4	23.7		81			
1932-33	17.5	7.8	22.4	27.3		68			
1933-34	30.4	26.2	25.7	31.5	46.3	77	1.8	.068	.327
1934-35	14.5	31.8	29.8	35.0	51.9	83	8.7	.272	.068
1935-36	9.8	33.3	40.5	47.0	56.2	96	16.1	.482	.272
1936-37	27.4	37.0	9.1	20.1	62.5	107	15.8	.428	.482
1937-38	16.2	34.9	42.3	51.5	67.1	101	29.3	.840	.428
1938-39	19.7	32.7	29.2	37.3	64.5	104	25.2	.769	.840
1939-40	24.5	31.9	34.4	41.2	67.5	112	27.1	.848	.769
1940-41	26.8	31.2	34.2	37.9	72.1	129	22.1	.710	.848
1941-42	31.9	34.5	32.0	32.2	82.3	146	20.0	.580	.710
1942-43	45.2	34.8	34.6	34.7	91.2	206	18.9	.542	.580
1943-44	62.2	36.5	36.8	36.8	102.2	235	10.7	.294	.542
1944-45	65.3	37.2	38.7	38.7	111.6	252	10.1	.271	.294

(Continued on next page.)

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POSITIONS OF

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200	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000
300	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000
400	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000
500	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000
600	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000
700	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000
800	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000
900	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000
1000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000	1000000000

1000000000 1000000000 1000000000 1000000000 1000000000

1000000000

Table 5 continued.

Season	Season average farm price	Domestic con- sumption	Movement from growers to domestic trade	Domestic trade supply excluding trade carry-in	United States personal con- sumption ex- penditures	Index of United States nonagri- cultural income, average 1935-1939=100	United States stocks on hand, Sept. 1	Relative stocks on hand Sept. 1 (col. 7/ col. 2)	Relative stocks on hand Sept. 1 lagged one year
	1	2	3	4	5	6	7	8	9
	cents per pound		millions of pounds		billions of dollars		millions of pounds		
1945-46	64.9	36.8	37.7	41.6	123.1	249	10.4	.282	.271
1946-47	62.7	42.3	33.8	37.9	146.9	266	16.3	.385	.282
1947-48	68.4	41.2	34.9	40.5	165.6	294	23.8	.578	.385
1948-49	55.4	39.7	36.4	40.3	177.9	304	28.2	.712	.578
1949-50	57.0	37.3	31.5	37.2	180.2	316	29.9	.802	.712
1950-51	62.1	35.8	32.9	36.2	193.6	359	23.7	.663	.802

a/ Summarized in Table 6. Data from columns 1, 2, 4, 5, 7, 8, and 9 were used for sets of regression equations I, II, and III, Table 6. Data from columns 1, 3, and 6 were used for regression equation IV, Table 6.

Sources: Cols. 1, 2, 7 from Table 3 and Table 3 sources. Cols. 3 and 4, 1933-34 through 1945-46, U. S. Bureau of Agricultural Economics, Outlook for Hops from the Pacific Coast, Washington, D. C., November, 1948; 1946-47 through 1950-51, estimated from data in Federal-State Market News Service, Hop Market Review, San Francisco, California.

Col. 5, from U. S. Bureau of Foreign and Domestic Commerce, National Income, 1951 Edition, A Supplement to the Survey of Current Business, Washington, D. C., 1951.

Col. 6, computed from data published monthly in Survey of Current Business, Bureau of Foreign and Domestic Commerce, U. S. Dept. of Commerce.

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TABLE 6
Summary of Regression Analyses and Auxiliary Statistics

Equation number ^a	Dependent variable	Constant term	Independent variables									Adjusted multiple correlation coefficient	
			X_2	X_3	X_4	X_5	X_5^2	$\log_{10} X_5$	X_6	X_7	X_8		
figures in parentheses are t-ratios													
Ia	X_1	-14.7551	1.1408 (1.3705)		-0.0035 (0.0095)	0.3543 (5.2710)				-1.1007 (3.5193)		0.9003	
Ib	X_1	-14.8691	1.1407 (1.4222)			0.3544 (5.4725)				-1.1017 (3.8847)		0.9078	
Ic	X_1	-148.1301	0.1371 (0.2108)					104.4762 (8.2108)		-1.1245 (5.4100)		0.9513	
Id	X_1	-147.3083						106.5092 (13.2654)		-1.1239 (5.5885)		0.9545	
IIa	X_1	74.2671			-0.0013 (0.0062)	-0.1083 (1.1143)			2.4049 (5.3080)		-40.9179 (6.4536)	0.9647	
IIb	X_1	74.2250				-0.1083 (1.1564)			2.4049 (5.5084)		-40.9307 (7.1198)	0.9673	
IIc	X_1	20.2017				0.3863 (8.4277)					-35.5590 (3.6504)	0.8998	
IId	X_1	-29.0546				1.3491 (7.3865)	-0.0041 (5.3314)				-30.2370 (5.1444)	0.9657	
IIe	X_1	-133.2791						98.4459 (12.4231)			-36.3902 (5.2426)	0.9504	
IIIa	X_1	17.9664				0.3854 (8.6535)					-48.5382 (3.6301)	18.0074 (1.3742)	0.9057
IVa	X_1	-65.7886		-0.4886 (2.1261)				50.2057 (4.4642)	0.6232 (3.2750)				0.9355

a/ Sets of equations I and II and equation IIIa are for period 1933-34 through 1950-51. Equation IVa is for period 1923-24 to 1950-51, omitting 1941-42 through 1945-46.
(See following page for description and sources of variables.)

Table 6 continued.

<u>Source</u>	<u>Variable</u>	<u>Description of Variable</u>
<u>Table</u>	<u>Col.</u>	
5	1	x_1 = Season average farm price of hops (cents per pound).
5	2	x_2 = Domestic consumption (millions of pounds).
5	3	x_3 = Movement from growers to domestic trade (millions of pounds).
5	4	x_4 = Domestic trade supply excluding trade carry-in (millions of pounds).
5	5	x_5 = United States personal consumption expenditures for sets of equations I, II, and III (billions of dollars); and
5	6	Index of United States nonagricultural income for equation IV.
	x_6	= Time, origin between 1941-42 and 1942-43 (6-month intervals) for sets of equations I, II, and III; origin between 1934-35 and 1935-36 (6-month intervals) for equation IV.
5	7	x_7 = United States stocks on hand, September 1 (millions of pounds).
5	8	x_8 = Relative stocks on hand, September 1 (= x_7/x_2).
5	9	x_9 = Relative stocks on hand, September 1, lagged one year.

2 6 x^0 = negative stocks on hand, regardless of holding time.

2 8 x^8 = negative stocks on hand, regardless of time ($= x^0$).

2 3 x^1 = positive stocks on hand, regardless of time (influence of demand).

2 9 x^2 = total (absolute difference) of negative stocks less than 100% of the period of time (absolute difference) of positive stocks less than 100% of the period of time.

2 8 x^3 = negative stocks less than 100% of the period of time.

2 9 x^4 = positive stocks less than 100% of the period of time.

2 8 x^5 = positive stocks less than 100% of the period of time.

2 9 x^6 = negative stocks less than 100% of the period of time.

Temp. COT.

Stocks

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Temp. COT.